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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/601,540

09/06/2000

David Tomanek

6550-000017

4174

7590

08/24/2005

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EXAMINER

BRITTAIN, JAMES R

ART UNIT

PAPER NUMBER

3677

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center"><b>Office Action Summary</b></p>	<p><b>Application No.</b></p> <p>09/601,540</p>	<p><b>Applicant(s)</b></p> <p>TOMANEK ET AL.</p>	
	<p><b>Examiner</b></p> <p>James R. Brittain</p>	<p><b>Art Unit</b></p> <p>3677</p>	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 May 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,24-29,35,36,39-42,44-51,57,58,61-65,70,71,73 and 85-88 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,24-29,35,36,39-42,44-51,57,58,61-65,70,71 and 73 is/are allowed.
- 6) ☒ Claim(s) 85-87 is/are rejected.
- 7) ☒ Claim(s) 88 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102/103*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. §102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

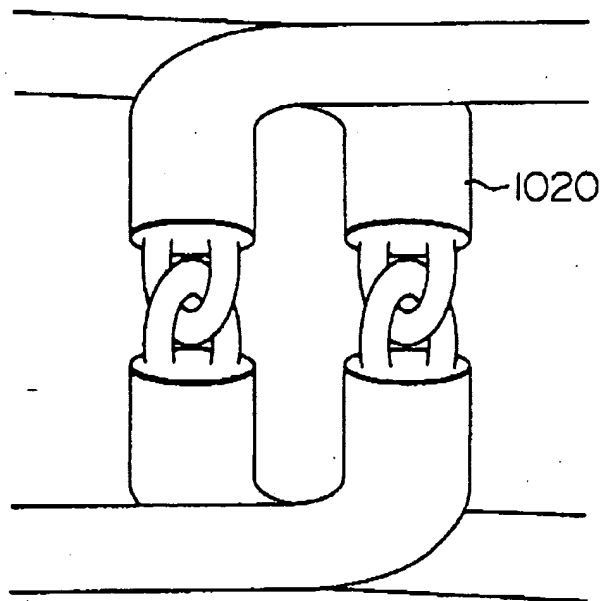
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 85 is rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103 as obvious over Ihara et al. (US 5464987).

Ihara et al. (figure 10) teaches a microfastening system comprising a first fastening element comprising two nanotubes, each comprising a half torus, secured to a lower substrate comprising the two surfaces facing upward interengaging with a second fastening element comprising two nanotubes, each comprising a half torus, secured to an upper substrate comprising the two surfaces facing downward. The middle portion of figure 10 is reproduced below.



The nanotubes are mechanically interconnected as shown in the above figure. Ihara indicates the method of making the microfastening system comprises harvesting half-tori by dividing the toroidal molecules in two and then fixing the molecules in opposite directions to each other to the respective substrate (col. 8, lines 4-13). This interconnection inherently requires the elements of the connection be so disposed so as to become mechanically interconnected as the first and second fastening elements comprising the substrates and half-tori are joined by advancing toward each other. While this bringing together of all the components to form the fastener is not stated in Ihara et al. it is the obvious process by which the final product is created and as such is also obvious over the teachings of Ihara et al. Further, the extending nanotubes once secured as shown above are still capable of having the substrates advancing toward each other because there is space for them to do so and so meet the language "wherein extending nanotubes on both fastening elements are disposed so as to remain permanently fixed to their respective fastening elements during the action of advancing the elements toward each other". It

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is emphasized that this quoted limitation only requires that the substrates can move toward each other when the nanotubes are mechanically interconnected and the device of Ihara et al. has this characteristic as shown in the above figure since the nanotubes are not tightly gripped by the opposite nanotube.

Claim 86 is rejected under 35 U.S.C. §103 (a) as being unpatentable over Ihara et al. (US 5464987).

Ihara et al. (figure 10) teaches a microfastening system comprising a first fastening element comprising two functionalized nanotubes, each comprising a half torus, secured to a lower substrate comprising the two surfaces facing upward interengaging with a second fastening element comprising two functionalized nanotubes, each comprising a half torus, secured to an upper substrate comprising the two surfaces facing downward. The toroidal molecules are carbon nanotubes that include pentagons and heptagons to provide their curvature as shown in figure 1 and are therefore considered functionalized. Ihara indicates the method of making the microfastening system comprises harvesting half-tori by dividing the toroidal molecules in two and then fixing the molecules in opposite directions to each other to the respective substrate (col. 8, lines 4-13). This interconnection inherently requires the elements of the connection be so disposed so as to become mechanically interconnected as the first and second fastening elements comprising the substrates and half-tori are joined by advancing toward each other. While this bringing together of all the components to form the fastener is not stated in Ihara et al. it is the obvious process by which the final product is created and as such is also obvious over the teachings of Ihara et al. Further, the extending nanotubes once secured as shown above are still capable of having the substrates advancing toward each other because there is space for them to

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do so and so meet the language “wherein extending nonaotubes on both fastening elements are disposed so as to remain permanently fixed to their respective fastening elements during the action of advancing the elements toward each other”. The difference is that Ihara et al. doesn't explicitly teach what the material of the substrate comprises for the mechanical connection of figure 10. However, it is taught that silicon is a material to which the molecules can be adsorbed (col. 5, lines 26-29). It would have been obvious to recognize from the teaching of Ihara et al. that silicon is a material to which the half-torus molecules can be adsorbed and therefore utilize it for the substrate.

Claim 87 is rejected under 35 U.S.C. §103(a) as being unpatentable over Ihara et al. (US 5464987) in view of Yakobson et al. (Fullerene Nanotubes: C<sub>1,000,000</sub> and Beyond).

Ihara et al. (figure 10) teaches a microfastening system comprising a first fastening element comprising two functionalized nanotubes, each comprising a half torus, secured to a lower substrate comprising the two surfaces facing upward interengaging with a second fastening element comprising two functionalized nanotubes, each comprising a half torus, secured to an upper substrate comprising the two surfaces facing downward. The toroidal molecules are carbon nanotubes that include pentagons and heptagons to provide their curvature as shown in figure 1 and are therefore considered functionalized. Ihara indicates the method of making the microfastening system comprises harvesting half-tori by dividing the toroidal molecules in two and then fixing the molecules in opposite directions to each other to the respective substrate (col. 8, lines 4-13). This interconnection inherently requires the elements of the connection be so disposed so as to become mechanically interconnected as the first and second fastening elements comprising the substrates and half-tori are joined by advancing toward each other. While this

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bringing together of all the components to form the fastener is not stated in Ihara et al. it is the obvious process by which the final product is created and as such is also obvious over the teachings of Ihara et al. Further, the extending nanotubes once secured as shown above are still capable of having the substrates advancing toward each other because there is space for them to do so and so meet the language “wherein extending nanotubes on both fastening elements are disposed so as to remain permanently fixed to their respective fastening elements during the action of advancing the elements toward each other”. The difference is that Ihara et al. doesn't utilize multi-walled nanotubes. However, Yakobson et al. (figure 2) suggests that multi-walled nanotubes are well known and from elementary mechanics it is well understood that multiple walls are stronger than single walled structures. As it would be beneficial to make the mechanical connection of Ihara et al. stronger, it would have been obvious to modify the nano-scale mechanical connection of Ihara et al. so that the half-tori are multi-walled in view of Yakobson et al. providing evidence of such structures as being well known and their use would be desirable for their inherently greater strength over single-walled structures, thereby providing a stronger mechanical connection.

***Allowable Subject Matter***

Claims 1, 24-29, 35, 36, 39-42, 44-51, 57, 58, 61-65, 70, 71 and 73 are allowed.

Claim 88 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

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Applicant's arguments filed May 2, 2005 have been fully considered but they are not persuasive.

Applicant argues the limitation indicating that the nanotubes are disposed so as to become mechanically interconnected as they advance toward one another is a structural limitation that distinguishes over Ihara et al. This argument is unpersuasive because the substrates can still move away from and toward each other a small amount while the nanotubes are engaged with each other as explained above.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James R. Brittain whose telephone number is (571) 272-7065.

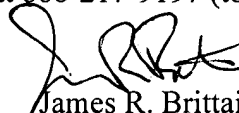
The examiner can normally be reached on M-F 5:30-2:00.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J. J. Swann can be reached on (571) 272-7075. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



James R. Brittain  
Primary Examiner  
Art Unit 3677

JRB